What is claimed is:

1. A method comprising:

constructing a state vector representing N pairs of entangled qubits;

selecting 2N operators to be respectively applied to the 2N corresponding qubits, wherein each of n players select one or more of the 2N operators for a set of the qubits assigned to the player;

applying each of the 2N operators only to a portion of the state vector that represents the qubit corresponding to the operator; and

evaluating a final state vector that results from the application of the 2N operators to thereby assign results to the players.

2. The method of claim 1, wherein N is equal to n, and each player selects 2 of the 2N operators.

3. The method of claim 1, wherein N is n(n-1)/2, and each player selects n-1 of the 2N operators.

4. The method of claim 1, wherein N is equal to a product of n(n-1) and a probability p, and p is less than 1.

5. The method of claim 4, wherein the probability p is equal to log(n)/n.

6. The method of claim 1, wherein software executed in a classical computer performs the step of applying the operators to the state vector.

7. The method of claim 1, wherein constructing the state vector comprises setting a system in a quantum state corresponding to the state vector.

8. The method of claim 7, wherein the system comprises 2N photons.

9. The method of claim 8, wherein the system is selected from a group consisting of SQUIDs, NMR systems, individual atoms, individual molecules, individual ions, cavity

quantum electro-dynamic (QED) systems; and photonic systems having quantum states implementing the qubits.

10. A system comprising:

a source of multiple channels of entangled photon pairs;

a plurality of stations, where each station is associated with one or more of the channels and is capable of performing a player-selected operation on states of photons associated with the station;

a first optical network that for each channel and each entangled photon pair in the channel, delivers a first photon from the entangled photon pair to a first of the stations associated with the channel and delivers a second photon from the entangled photon pair to a second of the stations associated with the channel; and

a measurement system coupled to measure the states of the photons after delivery to the stations.

11. The system of claim 10, wherein in each of the entangled photon pairs, a first polarization state of the first photon depends on a second polarization state of the second photon.

12. The system of claim 11, the player-selected operations of the stations change polarizations states of the photons.

13. The system of claim 12, wherein each station comprises:

a polarizing beam splitter;

a first polarization changing element in a path of a first polarization component exiting the polarizing beam splitter; and

a second polarization changing element in a path of a second polarization component exiting the polarizing beam splitter.

14. The system of claim 10, wherein each system consists of linear optics.

15. The system of claim 10, wherein each of the stations is associated with two of the channels.

16. The system of claim 10, wherein the plurality of stations comprises n stations, wherein each station is associated with n-1 of the channels.

17. The system of claim 10, wherein:

the stations comprise n stations; and

the channels comprise $p \cdot n(n-1)$ channels for a probability p less than 1.

18. The system of claim 17, wherein the probability p is equal to log(n)/n.

19. The system of claim 10, wherein the source of multiple channels of qubits comprises one or more correlated semiconductor light sources.

20. The system of claim 10, wherein the source of multiple channels of qubits comprises:

a laser; and

a parametric down-converter capable of converting a photon from the laser into a pair of photons in an entangled state.

21. The system of claim 10, wherein the source of multiple channels of qubits comprises:

a source of unentangled photons; and

a system that creates entanglements between photons in different channels.

22. The system of claim 10, wherein the measurement system comprises an optical system implementing a joint operation on the entangled photon pairs.

23. The system of claim 22, wherein the optical system unentangles the entangled photon pairs.

24. The system of claim 22, wherein the optical system comprises a controlled NOT gate.